
Site Summary – Building 4064 and Side Yard and Site 4864

Site Identification:

Building 4064 and Side Yard
Fuel Storage Facility
Includes Mechanical Equipment Slab (Site 4864)

Operational Use/History:

- The building was constructed in two phases. The first phase began in 1958, the second phase in 1963.¹
- The fuel storage facility was a vault built to provide secure storage for non-irradiated, fissionable nuclear material (enriched uranium and plutonium) used to make reactor fuel.
- Enriched uranium powders and source material powder packages were split into smaller units or combined into larger units in a glove box.¹
- In the early 1960s, the yard areas in the front, side and back of the building were used to store 55-gallon drums of low-level enriched recoverable scrap.¹
- By the early 1980s, most reactor contracts had ended. Following removal of all fissionable material, miscellaneous equipment and containers of radioactive waste (principally soil) were stored in the building.¹
- The facility operated until 1993, when all nuclear material was removed and the building was decontaminated.¹
- Demolished in 1997.¹

Site Description:

- Building 4064 was constructed in two phases:
 - Phase One: A 2,127-square-foot reinforced concrete structure with 11-inch thick walls was constructed on a concrete slab and a fume hood was installed.
 - Phase Two: A new bay was added to the north of the original structure, increasing the total size to 4,418 square feet. The addition was constructed with 12-inch thick concrete blocks.¹
 - The fenced-in yard was a 6,580-square-foot area within a security fence. This area included a mechanical equipment slab, which was designated Site 4864 on the 1962 Industrial Planning Map.² Site 4864 is not included on any subsequent maps and was absorbed by Building 4064.³
 - The side yard was designated as the 4,500-square-foot area near Building 4064.⁴
 - Included in the two-acre area surrounding the facility were drainage pathways, former parking lot areas, the side yard, septic tank and a leachfield.¹

Relevant Site Information:

- Regulated radiological materials were managed at this facility. The potential COCs include various uranium isotopes, plutonium, thorium, and activation products.³
- There were no sinks or processing equipment in the building; the only water supply was in the restroom. Initially, sanitary wastewater was discharged to a septic tank and leach field. In the early 1960s, the facility was connected to the local sewage system, and the leach field was disconnected. The facility was equipped with a high-efficiency particulate air (HEPA) filtered exhaust system.¹
- Several incidents are recorded for this facility that could have involved releases of radioactivity to the environment:
 - On February 18, 1963, an area of soil and concrete was discovered to have elevated levels of radioactivity (1×10^6 dpm/gram for Cs-137 and 2×10^5 dpm/gram for Cs-134). Further surveys showed that 700 square feet of soil and concrete were contaminated with mixed fission products with a maximum of 700 mrad/hr at 2 inches. Though no firm evidence of the source was discovered, it was assumed that the contamination was a result of a leak from a drum containing irradiated Seawolf submarine reactor fuel pins. It is likely that the drum plug rusted through and allowed any liquid in the drum to leak out. The area was excavated, reducing the contamination to an acceptable level of 0.5 mrad/hr (A0028).
 - On October 8, 1964, following shipment to the vault, it was discovered that a can of uranium carbide had oxidized inside the shipping container (“birdcage”), causing the lid of the can to blow open and the bottom of the can to warp. This resulted in alpha radiation levels on the concrete dock to increase from less than 1 dpm/100 cm² (clean level) up to 200 dpm/100 cm² (A0468).
 - On July 20, 1967, a significant increase in alpha radioactivity was detected on vegetation in the Side Yard. Investigation revealed that a 55-gallon drum containing U₃O₈ had been opened outside on a piece of plastic sheeting. U₃O₈ was visible on the sheeting and it was believed that some had been dispersed by wind in the area, contaminating the vegetation. The plastic sheeting was removed and appropriately dispositioned (A0622).

Radiological Surveys:

- In 1988, Rocketdyne conducted a radiological survey of the source and special nuclear material (SNM) storage vault in Building 4064.⁵
 - Scope: Ambient gamma exposure rate measurements were taken in the storage yard and surrounding area. Soil samples, debris and miscellaneous items were also analyzed. Radiological contamination quantities were compared against unrestricted-use acceptable contamination limits prescribed by DOE 5400.1.²
 - Samples were taken in the interior of the building to test for alpha and beta contamination.
 - Average alpha value: 10.5 dpm/100cm²
 - Average beta: 388 dpm/100 cm².

- Derived Concentration Guideline Level (DCGL): 5000 dpm/100cm².
- Survey results for the interior walls and floors were below the acceptable limits.
- Miscellaneous building features were surveyed by indication only. The light fixtures, a floor mop and the fume hood were found to be contaminated.
- The area within the fenced storage yard was surveyed for ambient gamma. A contaminated area was found bordering and outside of the eastern fence. This area, measuring approximately 300 square feet, was significantly contaminated with rate readings of 50-100 μ R/hr at one meter. Soil samples from the vicinity showed elevated Cs-137 activity (2,500 pCi/g, DCGL 100 pCi/g). Further remedial action for that area was required.
 - Remedial action occurred in 1990. The top layer materials for the side yard were removed and the residual activity was analyzed and compared to previous data. It was concluded that radiation and contamination levels in the side yard and other surrounding areas are well below acceptable regulatory limits.⁴
- ORISE performed a final verification survey in December 1992, during which three Cs-137 hotspots in the Building 4064 Side Yard were discovered. One hotspot was found to contain 210 pCi/g of Cs-137. The second was measured at 35.1 pCi/g, and the third was measured at 27.7 pCi/g. (Allowable limits for Cs-137 were 7.08 pCi/g average in 100 m² or 70.8 pCi/g maximum in 100 m².) Following additional remediation of these areas, ORISE conducted an additional verification survey and published its findings in 1993.⁶
- The site was included in the Area IV survey in 1995, and additional locations above release limits were found in the side yard and across the street (G Street). Additional remediation occurred in 1997 and 1998.⁷
- In 1998, Rocketdyne performed a final status survey for Building 4064.⁷
 - The entire area was surveyed and sampled. A direct surface gamma scan and ambient gamma exposure measurements at 1 meter above ground were performed. Soil samples were also collected.
 - The highest Cs-137 concentration in soil was 3.1 pCi/g or 28 percent of the DCGL (9.2 pCi/g) for Cs-137.
 - The average net ambient gamma measurement was 4 μ R/hr, which is below the acceptance limit of 5 μ R/hr above background.
- In 1998, ORISE conducted a final verification survey of the Building 4064 side yard and other land areas following the demolition of the building and remediation of the yard.⁶
 - ORISE performed gamma surface scans and conducted soil sampling at the site.
 - One area was identified with elevated gamma radiation. Additional remediation was performed immediately and post remediation samples were collected. Post remediation samples had gamma exposure rates ranging from 9 to 13 μ R/hr, which is below the acceptable limit of 5 μ R/hr above background (background is 14 μ R/hr).

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- Soil samples ranged from less than 0.06 to 2.9 pCi/g for Cs-137, which is below the DCGL of 9.2 pCi/g.
- DHS also performed a verification survey in October 1998.¹

Status:

- DOE released Building 4064 for demolition in 1996.⁸
- DHS concurred with the release of the building for demolition in 1996.⁹
- Building 4064 was demolished and the septic tank and leach field were removed in 1997.¹
- A certification docket has been submitted to DOE.³
- On January 31, 2005 DOE provided a letter to Boeing declaring that Boeing and ORISE surveys had confirmed that DOE and DHS approved soil cleanup limits had been met, and that the 4064 site was suitable for release for unrestricted use.¹⁰

References:

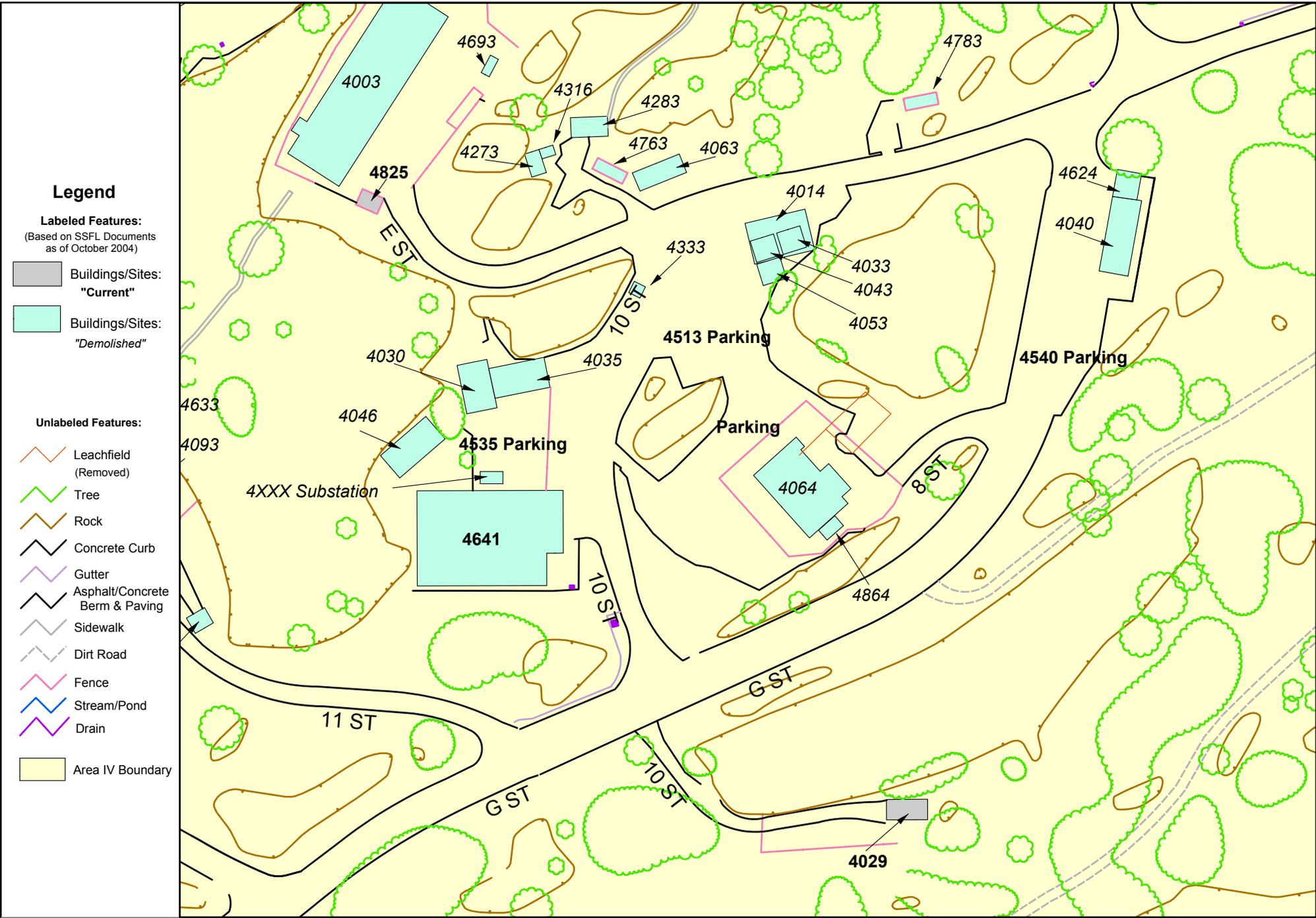
- 1- Boeing Document, EID-04600, "Final Report, Decontamination and Decommissioning (D&D) of Fuel Storage Facility 4064," September 11, 1999.
- 2- SSFL Area IV, ETEC Industrial Planning Maps, 1962-1992.
- 3- U.S. DOE, Oakland Operations Office Document, DOE/CD-ETEC-4064, "Draft Docket for the Release of Facility 4064 at the Former Energy Technology Engineering Center," September 1999.
- 4- Rocketdyne Report, N704SRR990031, "Final Decontamination and Radiological survey of the Building T064 Side Yard," October 20, 1990.
- 5- ETEC Document, GEN-ZR-005, "Radiological Survey of the Source and Special Nuclear Material Storage Vault at Building T064," August 19, 1988.
- 6- ORISE, Letter, "Second Addendum to the Verification Survey of Buildings T064 Side-Yard, SSFL, Ventura County, California (ORISE 1993 and 1994)," from T. Vitkus, (ORISE) to A. Gupta (DOE), January 25, 1999.
- 7- ETEC Document, RS-00003, "Area 4064 Final Status Survey Report," March 30, 1999.
- 8- DOE, Letter, "Demolition of Building 064," from M. Lopez (DOE) to M. Lee, (Rocketdyne) June 25, 1996.
- 9- DHS/RHB, Letter, "Demolition and Disposal of Structural Material from Building T064 at SSFL," from G. Wong (DHS/RHB) to P. Rutherford, August 19, 1996.
- 10- DOE Letter, "Release of Building 4064," from M. Lopez (DOE) to M. Lee (Boeing), January 31, 2005.
- 11- Historical Site Photographs from Boeing Database.

Photograph 1 – Building 4064



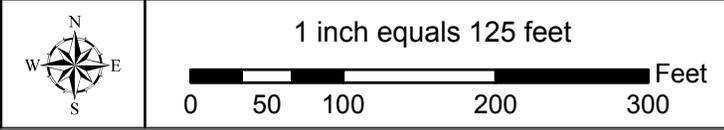
Photograph 2 – Building 4064





DRAWN BY: **Sapere CONSULTING INC**

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Site Summary Group E
AREA IV
Santa Susana Field Laboratory, CA